

C4221 Log Data Report

Borehole Information:

Borehole: C4221		Site: 216-U-8 Crib			
Coordinates (WA State Plane)		GWL (ft)¹: Dry		GWL Date: 03/11/2004	
North	East	Drill Date	TOC² Elevation	Total Depth (ft)	Type
Not Available	Not Available	March 2004	Not Available	50	Push Hole

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Threaded steel	+0.3	6 5/8	5 1/2	9/16	+0.3	50

Borehole Notes:

Zero reference is the ground surface. The logging engineer used a caliper to determine the outside casing diameter. The caliper and casing stickup were both measured using a steel tape. Inside casing diameter was measured with a steel tape. All measurements were rounded to the nearest 1/16 in.

Logging Equipment Information:

Logging System:	Gamma 1G	Type:	SGLS (35%) 34TP10967A
Calibration Date:	01/2004	Calibration Reference:	GJO-2004-597-TAC
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4 / Repeat	
Date	03/11/04	03/15/04	03/15/04	03/15/04	
Logging Engineer	Spatz	Spatz	Spatz	Spatz	
Start Depth (ft)	12.0	48.86	48.0	12.0	
Finish Depth (ft)	0	48.86	13.0	7.0	
Count Time (sec)	200	200	200	200	
Live/Real	R	R	R	R	
Shield (Y/N)	N	N	N	N	
MSA Interval (ft)	1.0	N/A ³	1.0	1.0	
ft/min	N/A	N/A	N/A	N/A	
Pre-Verification	AG044CAB	AG047CAB	AG047CAB	AG047CAB	
Start File	AG046000	AG047000	AG047001	AG047037	
Finish File	AG046012	AG047000	AG047036	AG047042	
Post-Verification	AG046CAA	AG048CAA	AG048CAA	AG048CAA	
Depth Return	0	N/A	N/A	0	

Log Run	1	2	3	4 / Repeat	
Error (in.)					
Comments	No fine-gain adjustment.	Sonde tip is just touching bottom of borehole.	No fine-gain adjustment.	Repeat section.	

Logging Operation Notes:

Zero reference was ground surface. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K , ^{238}U , and ^{232}Th) verifier with serial number 118.

Analysis Notes:

Analyst:	Sobczyk	Date:	3/18/04	Reference:	GJO-HGLP 1.6.3, Rev. 0
-----------------	---------	--------------	---------	-------------------	------------------------

SGLS pre-run and post-run verification spectra were collected at the beginning and end of the day. All of the verification spectra were within the acceptance criteria. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 1.1 percent lower and 2.9 percent higher at the end of the day. Examinations of spectra indicate that the detector functioned normally during logging, and the spectra are accepted.

Log spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. The post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G1GJan04.xls). Zero reference was the ground surface. Based on the field measurements, the casing configuration was assumed as one string of 6-in. casing with a thickness of 9/16 in. to 48.86 ft (total logging depth). Dead time and water corrections were not required.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K , ^{238}U , and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 1764 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 609 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected in the interval between ground surface and 1 ft with concentrations ranging from 0.3 to 0.7 pCi/g, which was measured at 1 ft. The MDL for ^{137}Cs was approximately 0.2 pCi/g.

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides at energy levels of 609, 1461, 1764, and 2614 keV.

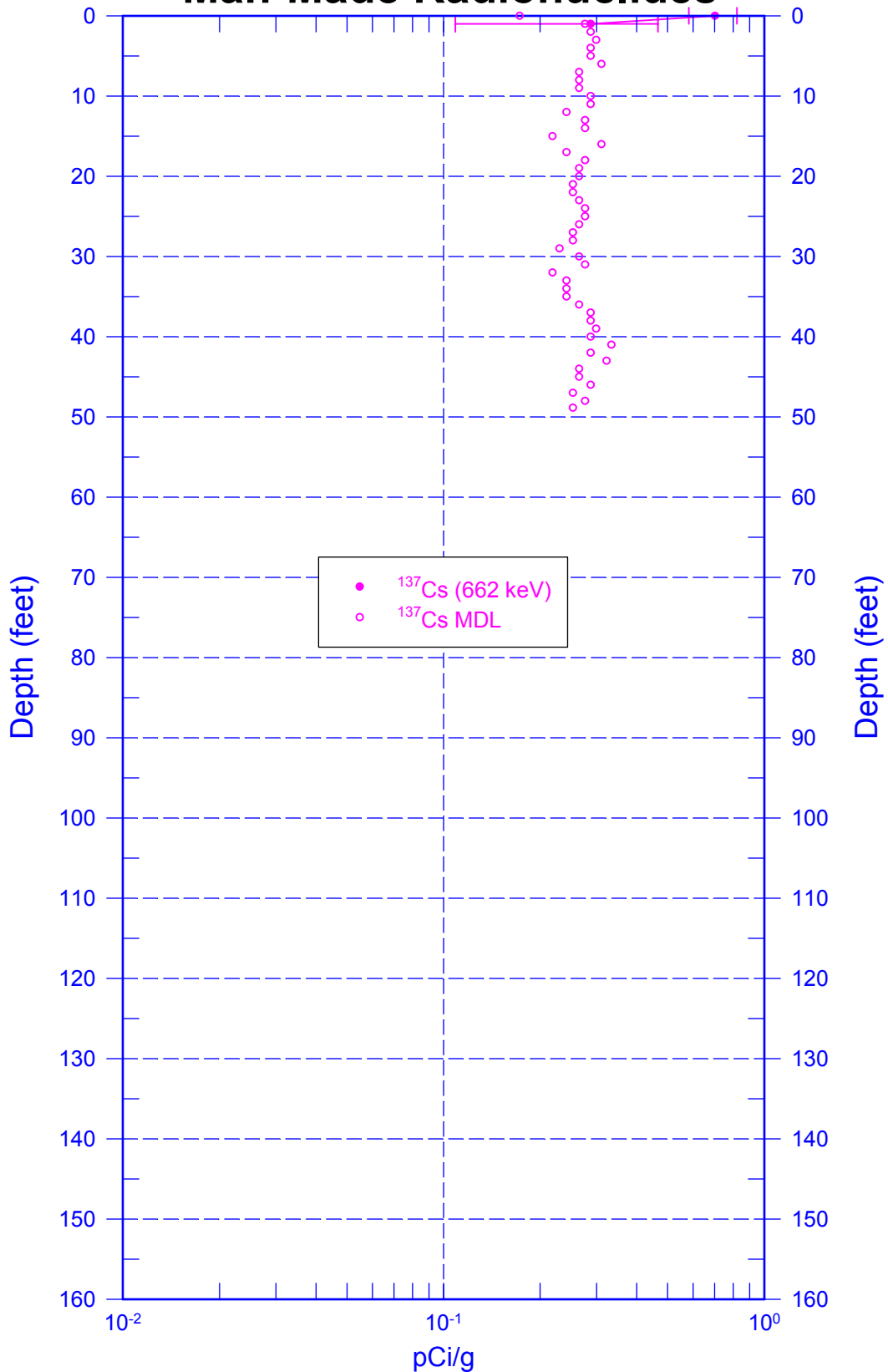
¹ GWL – groundwater level

² TOC – top of casing

³ N/A – not applicable

C4221

Man-Made Radionuclides

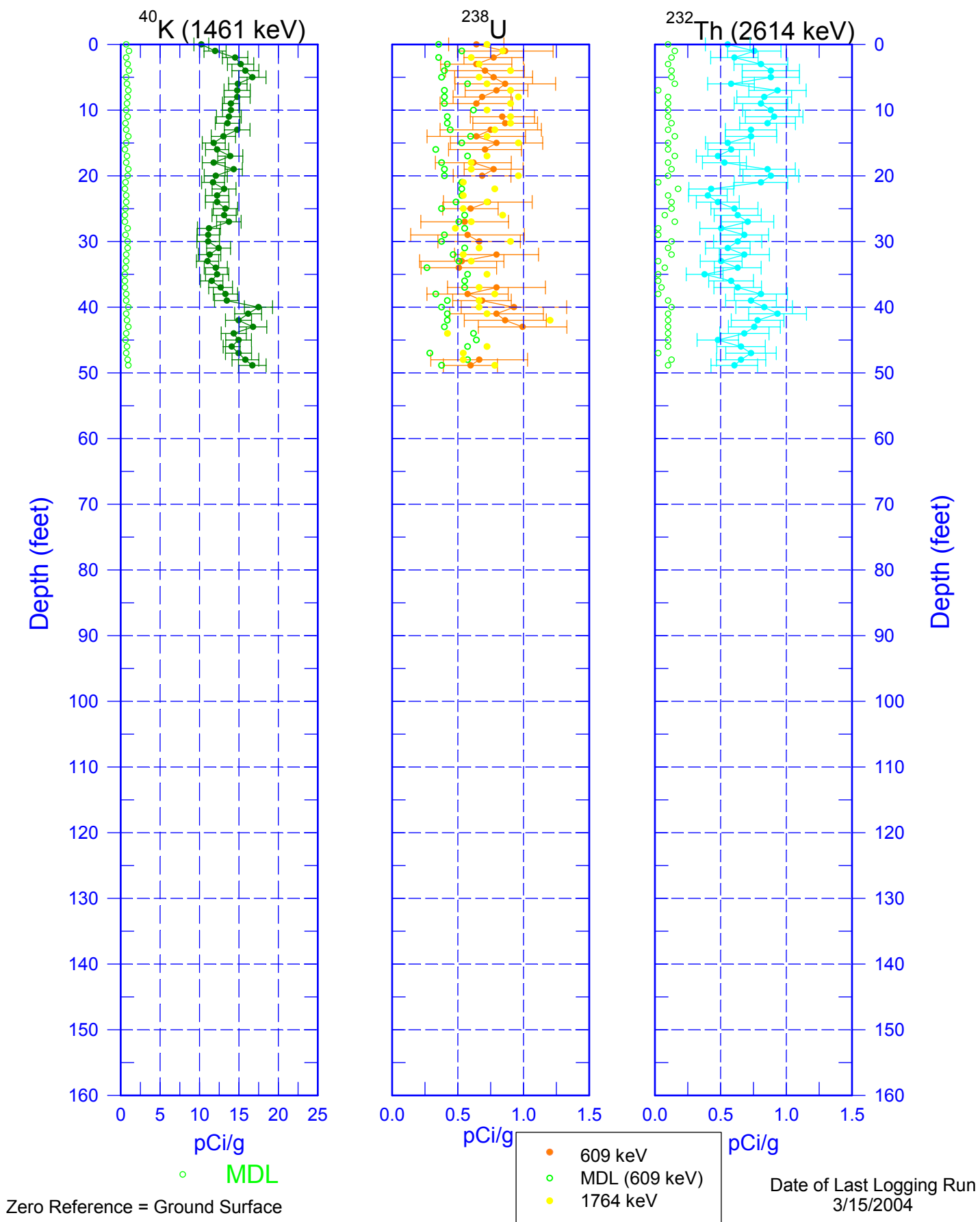


Zero Reference = Ground Surface

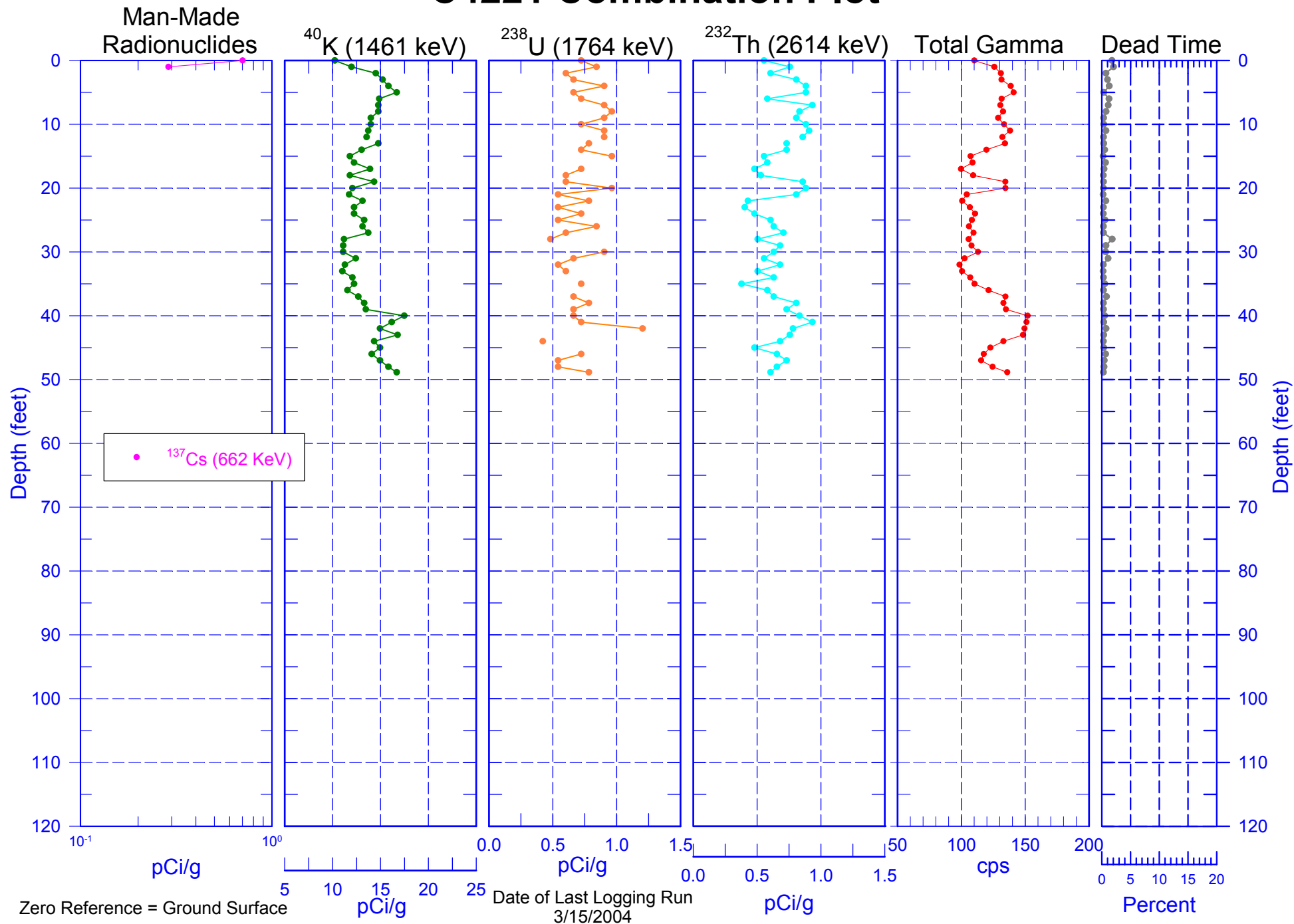
Date of Last Logging Run
3/15/2004

C4221

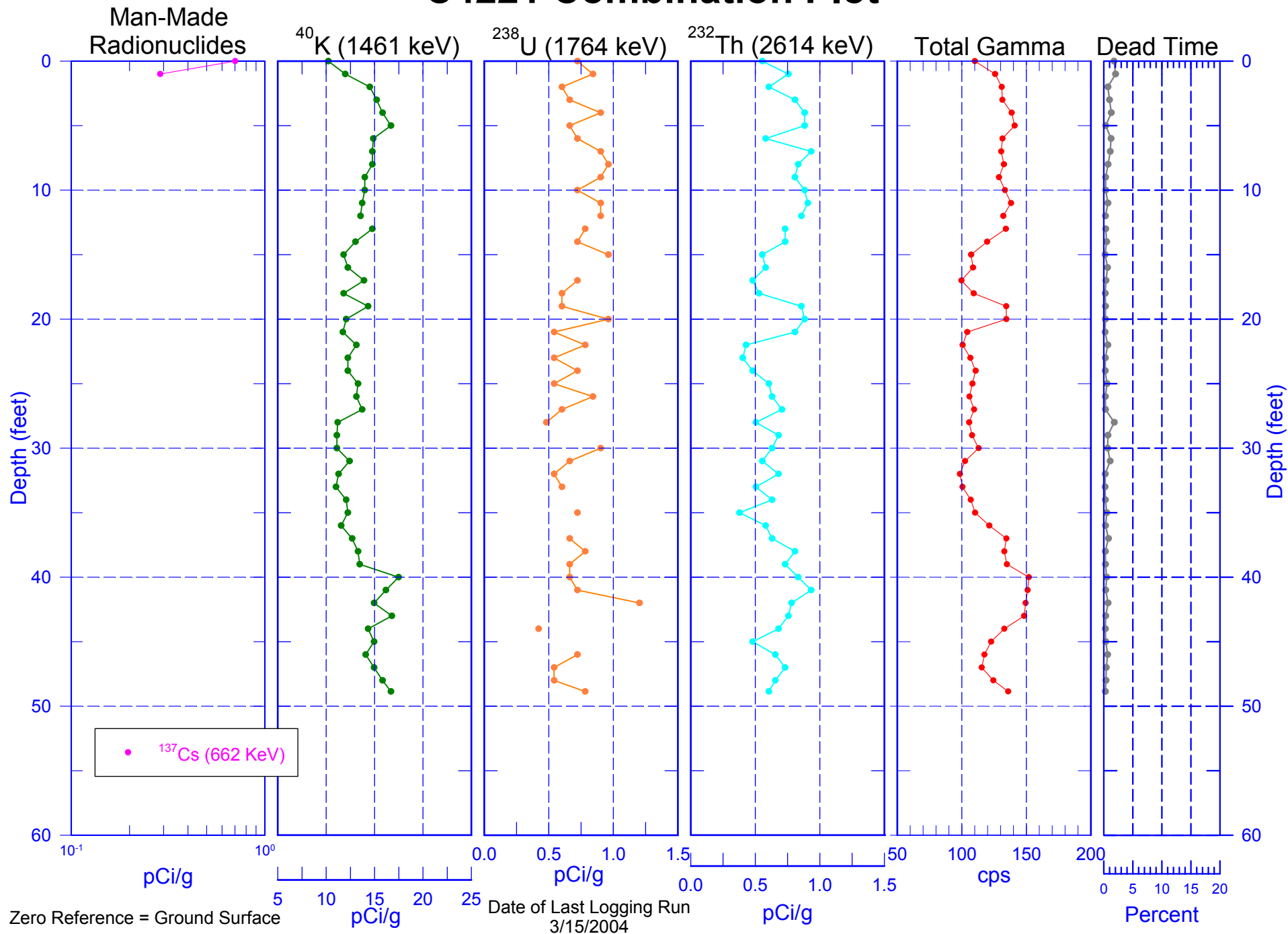
Natural Gamma Logs



C4221 Combination Plot

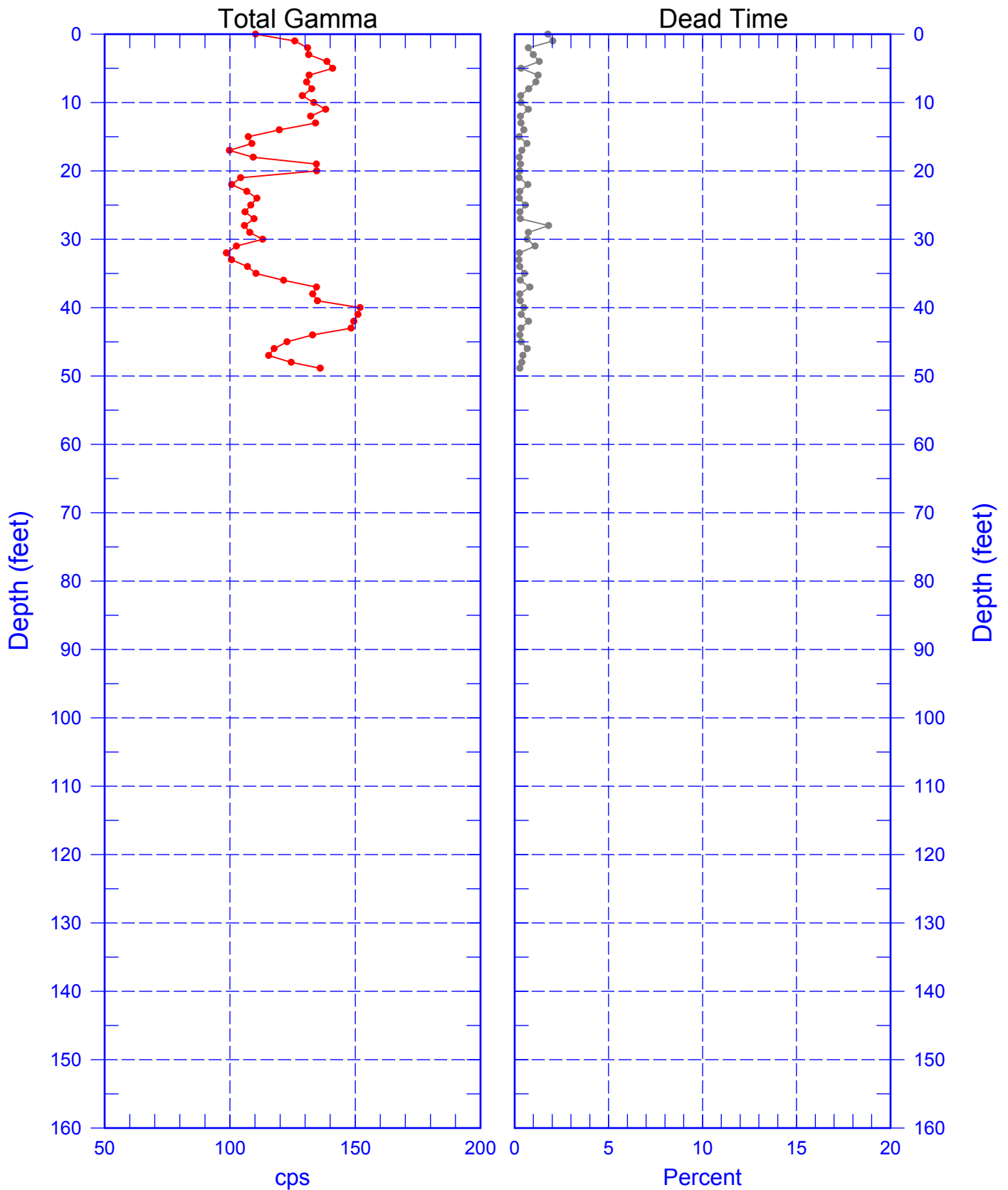


C4221 Combination Plot



C4221

Total Gamma & Dead Time



Zero Reference = Ground Surface
Date of Last Logging Run
3/15/2004

C4221

Rerun of Natural Gamma Logs (12.0 to 7.0 ft)

